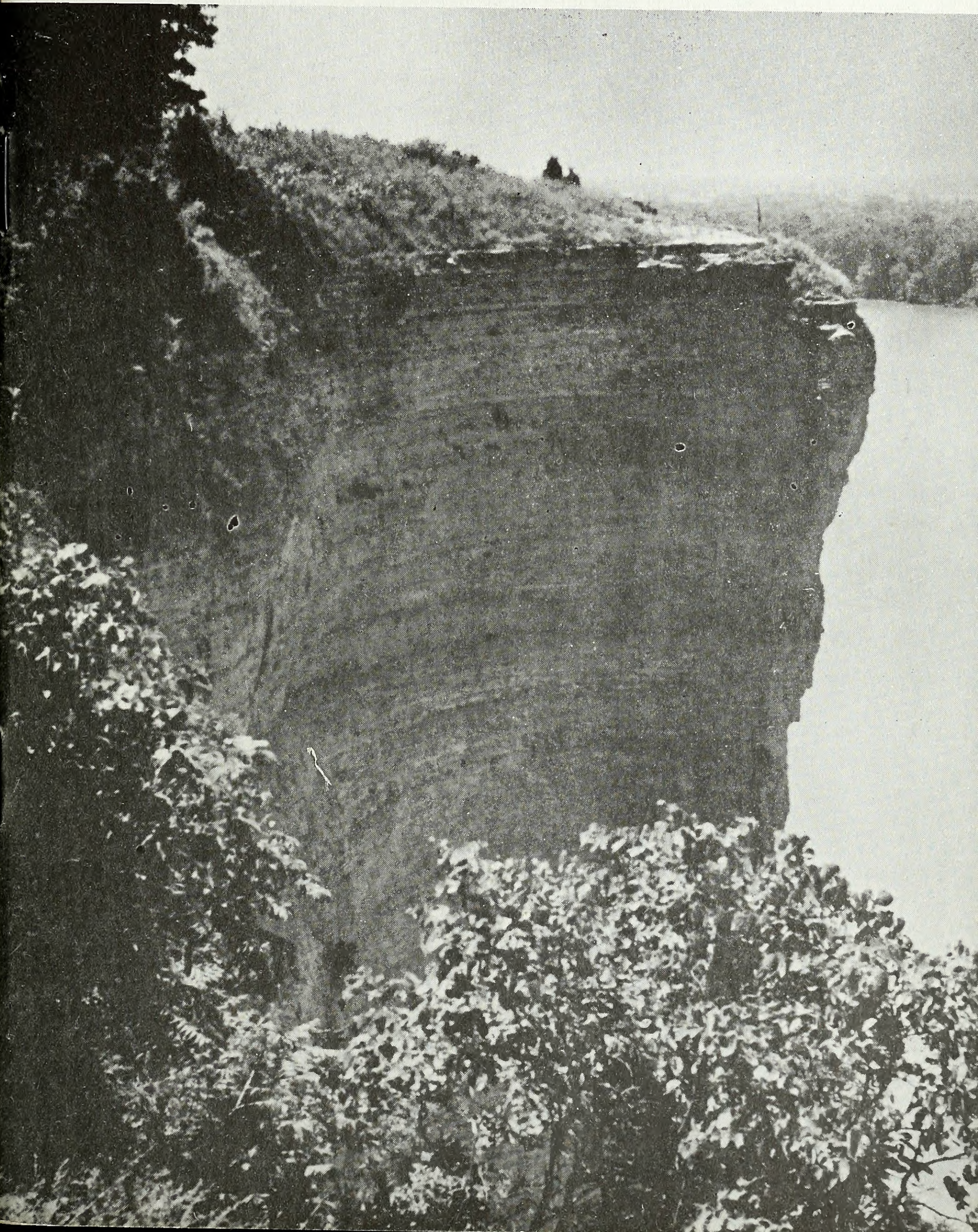
ELSAH BLUFF PRAIRIES:

ECOLOGICAL ANTIQUES

Marilyn K. Bland



Digitized by the Internet Archive
in 2011 with funding from
CARLI: Consortium of Academic and Research Libraries in Illinois

http://www.archive.org/details/elsahbluffprairi00blan

Elsah Bluff Prairies: Ecological Antiques

by

Marilyn K. Bland

Historic Elsah Foundation Leaflet Number Three

Copyright © 1972 by Historic Elsah Foundation

To Paul D. Kilburn,
for introducing me to the bluff prairies

Historic Elsah Foundation, P. O. Box 117, Elsah, Illinois 62028, publishes a quarterly newsletter and occasional leaflets. Paul O. Williams, editor.

ELSAH BLUFF PRAIRIES: Ecological Antiques

The Elsah Bluff Prairies of Illinois, located on the high cliffs overlooking the River Road north of Alton, are remnants of the native tall grass prairie that once stretched across continental mid-America. Adjacent to the village of Elsah these small grasslands are a part of the "prairie peninsula," an eastward extension of the native American grasslands into Illinois, Indiana, Ohio, Wisconsin, and Michigan. (See "Potential Natural Vegetation" map of the United States by A. W. Kuchler, University of Kansas, US Geological Survey, 1965.) The Elsah prairie areas, however, are unlike most of the original tall grasslands, for these bluff prairies, too steep for cultivation and too small for extensive grazing, have escaped the farmer's plow and management. Rooted atop castle-like promontories of limestone bluffs, some of them tower three hundred feet over the Mississippi River much as they did when Marquette and Joliet traveled down the Father of Waters in the 1670's. Thus, the Elsah Bluff Prairies have become ecological antiques.

Please do not confuse the term "prairie" with the typical grassland one encounters in the Midwest today. The latter are transplanted Eurasian meadows with few if any native species. Although the word "prairie" is of French origin, meaning "meadow," it was applied specifically to the open, grass-covered, treeless landscapes of middle America by the early settlers. As well as being the vegetational backdrop of the pioneering efforts in the Midwest, the native American prairie differs from other grasslands in the world both in species composition and in physical geography.

Along the Mississippi River from Wisconsin to Illinois is a chain of these grasslands which are often called "hill prairies." However, since the ones near Elsah are situated on high sculptured bluffs, thereby providing scenic vistas, they are locally called "bluff prairies." The Principia College Campus at Elsah, with four miles of frontage on the Mississippi, contains a large number of these small but distinct prairies.

SOUTHERN PRAIRIE SLOPES vs. FORESTED NORTHERN ONES

Located on exposed south and southwest slopes which are hot and dry during the summer, the Bluff Prairies, seldom exceeding one acre, represent dry (xeric) remnants of the tall grass prairie. These grassy knolls are quite in contrast to the oak-hickory woods which lie immediately over the crest of the bluff on the northerly facing slopes. Separated only by a few yards, the differences between these two plant communities can be appreciated both aesthetically as well as scientifically.

Microclimatic studies at Principia College have shown that the average temperature on the southern prairie slopes is up to 20 degrees F warmer than that of the forested northern ones during the summer months. In addition, the protruding bluffs receive greater wind velocities and have lower relative humidity readings. All of these features result in increased water-loss (transpiration) rates of the plants. This encourages the growth of grasses and discourages that of trees on the southern slopes.

The soils of the prairies and forests are both considered to be wind deposits called loess from the flood plains of the Pleistocene Rivers. However, they too can be contrasted with respect to depth and texture. Although the prairie soils vary considerably, the Elsah Bluff Prairies are often much sandier than those of the forested ravine, while the forest soils tend to have more clay. The prairie west of the Writer's Cabin on Principia College Campus, called the Black Widow Prairie, has up to 80 per cent sand with only 5 per cent clay in the topsoil, whereas that of Wason's Ravine on an adjacent north slope has approximately 40 per cent sand with up to 30 per cent clay. (The remaining percentages in both cases are of silt, a soil particle intermediate in size between loess and clay.) With respect to soil depth, at the stone-loess interface of the Bluff Prairies, the soil slumps over the rock and is very shallow, sometimes only a few inches in depth. The soil depth in the forested ravines is usually several feet.

Thus one can see that the habitat of the south-facing bluff prairie is a rigorous one with respect to heat and moisture. Plant ecologists term dry habitats such as this one as "xeric" plant communities, and they ask how the plants of this community have adapted to such an area on steep sandy slopes exposed to the wind and sun. But before we pursue this question, let us meet some of the more notable members of the prairie community.

PRAIRIE FLORA

The bulk of the prairie is knit out of grasses, the world's most important flowering plants to man. One of the most majestic of these grasses is big bluestem *(Andropogon gerardii).* Big bluestem, which is often more red than blue, is also sometimes called "turkey foot." (Technically this would be stated that its inflorescence is arranged in 3 to 6 finger-like racemes.) It is most commonly found in moister sites of the bluff prairies, areas where the soil is more loamy and the slope of the land more gentle. In these areas it may reach up to seven feet high or even "higher than a man on horseback" as early settlers used to describe it. It is considered to be one of the most robust and colorful of the numerous native grass species of the bluff prairie. As early as 1700 big bluestem was cultivated for its beauty in Provence in southern France where it first received its first scientific name.

Big bluestem is also of considerable economic value since it is considered to be the best prairie grass for both pasture and hay. It has a high protein content and produces great amounts of foliage during the summer months.

A closely related species of big bluestem is little bluestem, *Andropogon scoparius*. As its name implies, it is shorter than its big brother by as much as four feet. Similar to big bluestem, its name belies the fact that it, too, is usually more red than blue, particularly in the fall. Both of these species are typical of the majority of the prairie grasses in their origin from warmer, southern climates. Called warm season grasses, they renew their growth activity in late spring and grow continuously until early fall. However, there are a few "cool season" grasses of northern origin in the prairie too, such as Canada wild rye *(Elymus canadensis)*. These grasses renew their growth in early spring and make their maximum development from late March to early June.

Several other grass species can be found in the bluff prairie, but I will mention only two more: side-oats grama *(Bouteloua curtipendula)* and Indian grass *(Sorghastrum nutans)*. The latter is another of the "tall grasses" and is often found with big bluestem. In the fall its foliage is a deep golden color and its spikelets are velvet smooth to the touch. It can be found growing abundantly in the Snake Den Prairie, east of Eliestoun at Principia College.

Side-oats grama is a short grass like little bluestem; however its common name is much better suited: it has a very distinctive flowering spike with little "oats" forming on one side. It can be found growing both with little bluestem and by itself out on the furthermost promontories of the bluffs. Side-oats grama is extremely drought resistant and can grow in areas where the soil is only a few inches deep and the slope of the bluff is quite steep and exposed.

Although various species of grasses make up approximately two-thirds of the plant coverage in our native grasslands, a prairie contains much more than grasses. Over 250 species grow natively in the Bluff Prairies, 80 per cent of which are not grasses. This is not too surprising when one realizes that 75 per cent of the rare species only contribute 5 per cent of the total biomass in the prairie. Each species seems to have its place and add to the overall stability of the plant community. With the constant change in species of plants in flower at any given time, the prairie apparently budgets and manages its resources quite well. A contemporary plant ecologist, Dr. Clair Kucera from the University of Missouri, has pointed out how different this is from a corn field where all plants, since they are the same, have simultaneous needs. For example, germination demands for water and nutrients occur at the same time. Later on a single type of plant pest can destroy an entire field. Plant ecologists today are utilizing the prairie as a living laboratory to further investigate the idea that diversity in a community produces stability.

The non-grasslike plants in the prairie are called forbs. The prairie puts on a continual display of flowers beginning with the first spring puccoons *(Lithospermum canescens)* and *(L. incisum)* and comes to a colorful climax in late summer and early fall. A large percentage of the forbs in the Bluff Prairies are in the aster (Compositae), bean (Leguminosae), and mint (Labitate) families, although the total number of families represented is over 50. Here are some common species one might see in the fall:

In the aster family, besides various asters, one would probably see coneflowers *(Echinacea pallida & E. purpurea)*, blazing stars *(Liatris cylindracea)*, compass plants *(Silphium integrifolium)* and various goldenrods *(Solidago* spp.). Common on the steep sandy slopes west of the chapel on the Bluff Trail at Principia College is old field goldenrod, *(S. nemoralis)*. Look for short golden spikes with flowers on one side. Also common here are blazing stars. With bold purple flowers on both sides of a tall flowering spike, they indeed live up to their name. The coneflowers, which look like huge daisies with purplish petals and dark centers, are common to the bluffs east of Eliestoun. Compass plants can also be found in these same prairies. A very coarse, tall, yellow-flowered composite, it is known for its vertical leaves, the edges of which have the orientation of a compass; thus only the sides of the leaves receive the morning and afternoon sun.

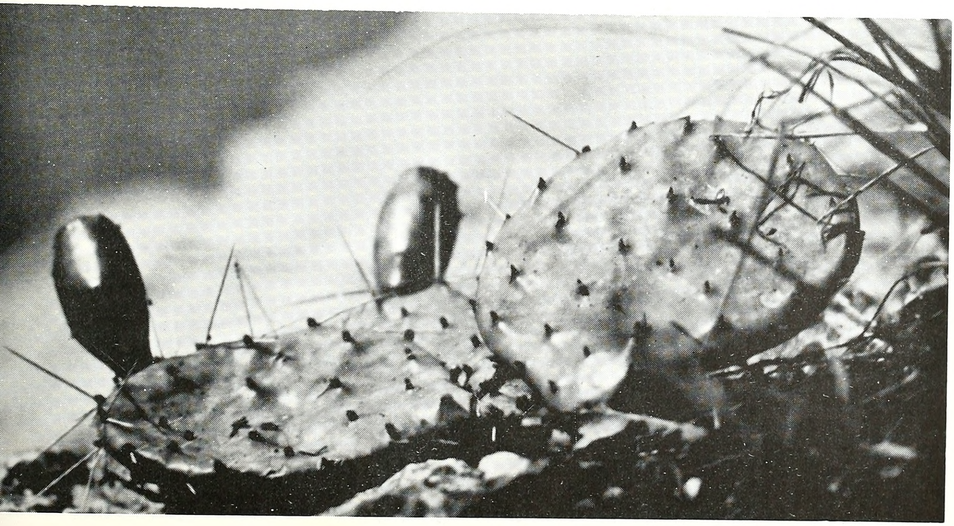
Also included in the bluff prairies are representative species from such diverse families as the orchid and cactus family. Prickly pear cactus *(Opuntia rafinesquii)* can occasionally be found growing on the steep, sandy prairies on the Bluff Trail from Principia College to Elsah. A fair sized colony of cacti is established at the lower portion of the Black Widow Prairie. In contrast, the delicate little white orchid *(Spiranthes gracilis)* can be found growing in the moister prairie areas at Pere Marquette State Park which borders Illinois River bluffs about ten miles from Elsah.

PLANT ADAPTATIONS

The diversity represented in kinds of individuals making up the prairie is also seen in the ways these plants have adapted to their xeric environment. Several of the grasses depend heavily on vegetative reproduction by means of underground stem systems called rhizomes. The rhizomes extend horizontally from the parent plant and produce new shoots from the tips or from the nodes of the stem, forming what is generally known as sod. The intricate

By June the prairie coneflower is already beginning to drop its lavender petals, but it still remains attractive to butterflies.

Prickly pear cactus thrives on the steep dry slopes of the bluff prairies. This fall picture shows developing fruit.



network of roots formed by the sod binds the soils against wind and rain erosion. In addition, this type of vegetative reproduction foregoes the necessity of having exacting environmental conditions often necessary for seedling establishment.

When reproduction of the prairie plants does occur by seed, the resulting seedlings often put down more root than shoot the first few days to ensure water requirements will be met. Big bluestem seedlings clearly illustrate this adaptation. In addition, germination of most prairie seeds is commonly delayed until a favorable time with respect to moisture availability, length of growing season, and temperature. Thus, although most of the seeds become ripe in the fall, they remain dormant for several months. Peak germination rate for several prairie species is not until 1½ years after the seed was produced.

By their vertical position preventing direct exposure to the midday sun rays and by the reduction of overall leaf area, the linear, grasslike forms of the grasses, sedges, and lily-like plants of the prairie serve to cut down on the amount of water lost from the plant. Succulent plants like the prickly pear cactus have solved the problem of water retention in quite a different way: by having thick, fleshy leaves which can store water.

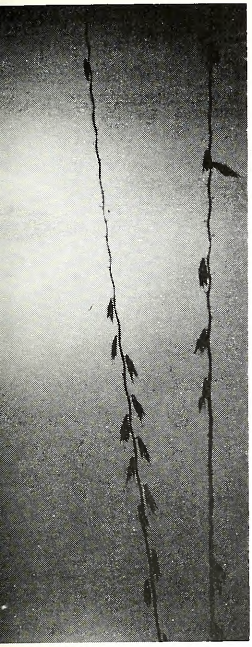
BLUFF FAUNA

The species diversity theme is carried over in the animal world, particularly with the insects and birds. Such birds as the mockingbird, white-breasted nuthatch, red-bellied woodpecker, blue jay, cardinal and chickadee are all year residents on the bluff prairies, while the brown thrasher, mourning dove, bluebird, cowbird, towhee, and song sparrow come in the spring and summer. In addition, the prairie is virtually humming with bees, ants, spiders, grasshoppers, midges, and butterflies, as well as numerous other insects.

Probably the most talked about vertebrate of the Elsah Bluff Prairies is the canebrake rattlesnake, but due to extensive collecting and killing of these animals in the late 1930's and 40's (to protect the college residents), they have become rare. In most cases only their names remain behind, e.g., the "Snake Den Prairie" east of Eliestoun.

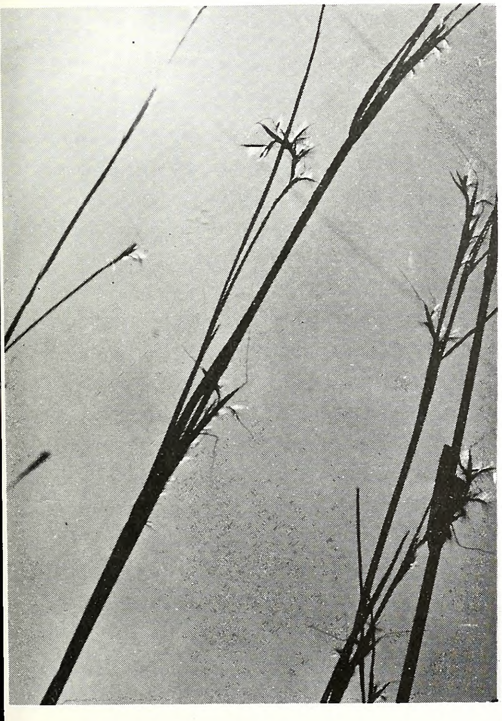
PRAIRIE MANAGEMENT

Both scientists and nature enthusiasts are now beginning to appreciate more fully the aesthetic and ecological value of the prairie. As a result, several attempts are being made not only to save the existing tall grass prairie remnants, but also to create new ones. Local botanists at Principia College are presently attempting to establish a five acre prairie in an area on campus which has been under cultivation for several years. Efforts are



Seen against a hazy sun are the distinctive wavy stems and "oats" of side-oats grama.

A close-up of little bluestem shows an inflorescence very different from its relative big bluestem.



Big bluestem lifts its turkey-foot inflorescence high above switch-grass.

also being made at the college to maintain the native bluff prairies as grasslands, for although they are not in too much danger of the plow or overgrazing, these plant communities are not climax in today's environment, i.e. they will not perpetuate themselves indefinitely. If not managed properly, the prairies gradually become overgrown with such shrubs as rough-leaved dogwood and sumac, and eventually, as the micro-climate becomes more mesic, the bluffs become forested. In the 37 years that the college has been at Elsah, considerable change within these prairies has occurred. Some of the bluff tops, which were formerly a shrub-dominated ecotone, have become forested with oak, hickory and ash saplings. Former trails have become overgrown; shrubs and trees in small ravines cutting riverward, have spread outward. In short, the bluff prairies have become smaller and smaller due to the invasion of forest elements. The restoration program at the College has included transplanting mature clumps of prairie grass to completely disturbed areas; cutting down woody plants and poisoning the stumps in areas which have become overgrown; and annual burning of an area of small prairies just below the picnic grounds.

Fire is considered by many to be the primary factor responsible for the persistence of the remaining tall grass prairies. Burning helps the prairie plants both directly by stimulating their flowering rate and their vegetative growth, and indirectly by reducing competition for water and light of the woody species. Most of the woody plants are much more sensitive to fire damage, since their renewal buds (those which initiate new growth) are located in the air. Nearly all of the prairie species, on the other hand, have their renewal buds at the ground surface or below. Researchers have found out that although a prairie fire can be quite fierce, it usually does not significantly affect the temperature at depths greater than 0.5 cm (0.2 inch) below the soil surface.

Thus fire, rather than destroying, has been an important factor in saving the ecological antiques. Today the bluff prairies are appreciated by many people, from natural historians to research scientists. If they are preserved, these small remnants of the tall grass prairie may in the future be of even greater importance as "people pastures,"--where one can roam in a mosaic of color and form and become refreshed with the breadth and tranquility of a natural setting.

The eastern fence swift is common on the bluff prairies.

Canebrake rattlesnakes are still found in remote parts of the bluff prairie. This one nestles in an outcrop just above the McAdams Highway.

REFERENCES ON ELSAH BLUFF PRAIRIES AND PRAIRIE FLORA

Anderson, R. C. 1970. Prairies in the prairie state. Trans. 177. State Acad. Sci. 63: 214-221.

Bland, M. K. and P. D. Kilburn. 1966. Bluff prairie vegetation and soil texture. Trans. Ill. State Acad. Sci. 59: 25-28.

Costello, D. F. 1969. The prairie world. New York: Thomas Y. Crowell Co. 242 pp.

Evers, R. A. 1955. Hill prairies of Illinois. Bull. Ill. Nat. Hist. Survey 26: 366-466.

Kilburn, P. D. 1970. Hill prairie restoration. Proc. of Symp. on Prairie & Prairie Restoration. Knox College, Galesburg, Ill.

Kilburn, P. D. and C. D. Ford. 1963. Frequency distribution of hill prairie plants. Trans. Ill. State Acad. Sci. 56: 94-97.

Kilburn, P. D. and D. K. Warren. 1963. Vegetation-soil relationships in hill prairies. Trans. Ill. State Acad. Sci. 56: 142-145.

MacRae, K. 1969. Elsah bluff trail guide. Mimeo from Principia College Biology Dept., Elsah, Ill.

Ranft, D. and P. D. Kilburn, 1969. Evapotranspiration contrasts between southfacing bluff prairies and northfacing forest. Trans. Ill. State Acad. Sci. 62: 85-90.

Weaver, J. E. 1954. North American prairie. Lincoln, Neb.: Johnsen Pub. Co., 348 pp.

Weaver, J. E. 1968. Prairie plants and their environment. Lincoln, Neb.: Univ. of Nebraska Press, 276 pp.

ACKNOWLEDGMENTS:

Toby Cooper, Principia College, and Clair Kucera, University of Missouri, for critically reading the manuscript.

Photographs by Christopher Ross, Paul O. Williams, and the author.

PRAIRIE ART

Blanketed with fall dew

the prairie is

(a) silver stillness.

But,

as (the) early sunbeams

jewel each dewdrop,

(the) prairie becomes

gold and purple,

red and yellow.

Yet,

in all its vibrant color,

the prairie retains

its modesty:

The
vertical
lines
of
grass

against the stretched out sky

make
simple
sturdy
designs.

Marilyn K. Bland